which I was preparing to treat with a second application of the thermocautery, when the patient confided that she had been indiscrete in her relations with her fiance and had missed her last menstrual period. In view of the possibility of pregnancy, I deferred the use of the cautery, and the patient did not return.

Case 3—Mrs. J. E. G., age 39, white, married, with one child, age 7 years, two years after the birth of the child began to have backache and pain during menstruation, which had gradually increased in severity. She also had profuse leukorrhea. Physical examination was negative except that exposure of the cervix uteri showed a granular ulcer at the upper margin of the external os, and redness and swelling of the endocervical mucosa. Two applications of 10 per cent solution of silver nitrate were made to the diseased cervical areas at intervals of one week. The leukorrhea diminished, but the inflammation persisted. October 13, 1921, the cervical ulcer and the mucosa of the cervical canal were cauterized under local anesthesia as described in the foregoing cases. Two weeks later the leukorrhea and backache disappeared, but later it returned to some extent after exertion in caring for a sick relative. January 5, 1922, the patient reported great relief from the backache, and there had been so little leukorrhea that she had discontinued the douches which she had been using for the last two or three years. Inspection of the cervix showed no sign of inflammation, its appearance being perfectly normal.

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EMETIN IN TYPHOID FEVER*

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For several years the first of the above authors has been so favorably impressed with emetin in the treatment of typhoid fever, that he has been led to determine its value by its routine use in as large a series of cases as possible. Along with the above study, we have carefully noted the classical symptoms and laboratory findings of the disease.

Two observations, hitherto unreported, have been carefully worked out and the results noted. The first of these is the lack of the association of intestinal protozoa in typhoid. The second observation is the early and almost constant occurrence of a positive "hoemoclastic cisis."

For the purpose of connecting our work with the literature that inspired it, we wish to cite the reports of Frazier beginning in 1911, and carried to a more convincing conclusion in 1915. We omit the literature of numerous isolated but spectacular cases from various parts of the world. There are criticisms of the method based entirely on laboratory experiments. The same investigative source substantiates its use. There is no outstanding criticism of the method based on clinical experience or research.

We have taken 100 cases, treated by the regular routine in vogue just previous to this work, and compared them in detailed percentages with the cases treated by the use of emetin. The points of economic and vital interest to public, hospital, and patient may be summarized briefly as follows:

First. The source of infection is always through the unsanitary management of an active case or through an unrecognized carrier. Therefore, any treatment that tends to render patients bacterially sterile is, at once, both clinically and economically of great value.

Second. The length of illness is of great importance. It involves suffering, expense, and danger of life. The number of days the patient is incapacitated is readily reducible to ledger figures. The lessening of suffering is not debatable. The death ratio in contagion is inversely proportional to the time and virulence of the disease. The hastening of a favorable termination by a single hour may save a life.

Any treatment that protects against the spread of disease or renders that disease less virulent, will decrease morbidity and work a public good. In order to show that the favorable statistical report that follows is not due to a fluctuating morbidity, we quote the following from the Eleventh Annual Report of the A. M. A. on typhoid fever.

"Deaths from typhoid per 100,000 population. Los Angeles, average by years, 1906-1910, 19.0; 1911-1915, 10.7; 1916-1920, 3.6; 1921, 2.6; 1922, 3.7." The cases untreated by emetin were taken from 1921, the year of lowest morbidity for our community.

The following table shows the comparison between sixty-one patients treated with emetin and one hundred treated by more usual methods.

	Patients Recovering		Fatal Cases	
	Not treated by emetin	Treated by emetin	Not treated by emetin	Treated by emetin
Onset to admission in days..	13.8	12.7	13	14
Onset to convalescence.....	41.3	24.9		
Onset to discharge or death..	58.1	42.7	24.6	23.75
Admission to discharge or death	44.75	32	12.3	9.75
Days spent in hospital.....	44.75	32	12.3	9.75
Percentage of deaths			16	6.5
Days saved in hospitalization per 100 patients		1275		
Lives saved per 100 patients.		9.5		

It will be noted that the treatment markedly shortened the course of the disease. The convalescence was not only decidedly hastened, but the severity of the disease lessened. No effort was made to hasten patients through before they were truly ready for home care. An additional five days per patient could have been gained by such a procedure. As the account stands, institutional care is saved at the rate of 1275 days per 100 patients. The above is negligible in comparison with the saving of life. The reduction in death rate from 16 per cent to 6½ per cent is an unimpeachable argument in favor of this treatment.

The complications were at times troublesome, but not of a nature to be influenced by emetin. Below is their enumeration with the number of cases and percentage:

Uncomplicated, 31 or 50.8 per cent; bronchopneumonia (not bronchitis), 13 or 21 per cent; intestinal hemorrhage, 3 or 4.9 per cent; intestinal perforation, 1 or 1.6 per cent; relapse, 3 or 4.9 per cent; cholecystitis, 2 or 3.2 per cent; meningeal symptoms, 2 or 3.2 per cent; otitis media, 2 or 3.2

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per cent; pulmonary tuberculosis, 2 or 3.2 per cent; urinary cystitis, 1 or 1.6 per cent; arthritis (acute), 1 or 1.6 per cent; syphilis, 1 or 1.6 per cent; thrombophlebitis, 1 or 1.6 per cent; furunculosis, 2 or 3.2 per cent.

The most common complication is bronchopneumonia. This occurred more frequently in the early cases, and was partly induced by the hydrotherapy used to reduce temperature. Sponge baths were later discarded except for cleanliness. Tepid enemas serve much better for antipyretic purposes.

The behavior of the white cell counts was very carefully studied. Since typhoid is associated with bacteriaemic and toxic conditions of the liver, we decided to apply the haemoclastic crisis test to these cases. The technic followed was, the white blood count on a fasting stomach; the ingestion of 300 cc.'s of milk; the white blood count repeated in one-half and again one hour later. The tests carefully made by internes were checked by Maner, pathologist to the hospital.

In 86 per cent of the series, decided digestion—leukopoenia, is shown in the early blood counts. Whatever may be its significance, this behavior of leucocytes is of service both in the diagnosis and in the treatment of typhoid fever. It occurs very early and if taken in conjunction with the usual typhoid leucopoenia, it helps to establish the diagnosis and it is of prognostic value. The average leucocyte counts of the series are as follows: 6680; 5506 and 5208. In the fatal cases the count was 5350; 5000 and 4600. Every complication except pulmonary tuberculosis increased the leucocyte count, but seldom changed the result of the haemoclastic test. It is also noted that the average count in the fatal cases was more than 20 per cent below the count of those that recovered. The greater the fall in white blood cells the more severe seems the toxaemia.

The haemoclastic crisis may be tabulated along with the other classical tests in the diagnosis of typhoid fever as follows: (1) Positive blood cultures after twelve days, 40 per cent; (2) rose spots at same time, 82 per cent; (3) Widal agglutination test, 84 per cent; (4) Widal haemoclastic crisis positive, 86 per cent; (5) palpable spleen in third week, 89 per cent.

The importance of the haemoclastic test in the diagnosis of typhoid fever seems to us to be well established.

In the early cases, we thought the beneficial effect of emetin might be traceable to the fact that certain cases of typhoid concurrently harbored intestinal protozoa. We, therefore, spent considerable time in searching for the later organisms. To date, we have not found a case infested with protozoa during the active state of typhoid or during convalescence. Whatever benefit is derived must, therefore, be attributed to some other source.

This preliminary report warrants a threefold conclusion:

1. Protozoa do not seem to be present in pathogenic abundance in any of the typhoid cases of this series. The disease would seem to inhibit their growth or destroy them.

2. The haemoclastic crisis as advocated by Widal as a liver-function test, is positive in so great a percentage of typhoid fever patients that its use is of diagnostic and prognostic value. So far as the authors are able to find out from the literature, this test has never been so applied before.

3. The routine use of emetin in typhoid fever is of decided benefit. It seems to shorten the course markedly, lessen complications, and save life. We believe its use will have a great influence in rendering every convalescent free from typhoid bacilli, and that the dreaded carrier will become as scarce as the disease ought to be.

We wish here to express our thanks to Huckleberry, Fox, Barnes, Colby, Keys, Fanson, Burling, Melcher, Bower, and Goldberg for their faithful and scientific work on the ward which made this research possible and of value. Especial appreciation is acknowledged to Medical Director N. N. Wood and to Superintendent Norman R. Martin for their splendid co-operation at all times.

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DISCUSSION

William J. Kerr, University of California Medical School, San Francisco—The report of Barrow and Franklin is of great interest to the medical profession. Although typhoid fever has ceased to be the great menace it once was in this country, there are a sufficient number of outbreaks with the usual mortality to warrant continued study of preventive and curative measures. Personally, I have had no experience in the use of emetin in typhoid fever. The results reported are very encouraging, and are confirmatory of previously reported studies. The outstanding value seems to be in the shortening of the period of illness and in the greatly reduced mortality rate. It should be kept in mind that the mortality rate may vary greatly in different epidemics, sometimes being as low as 5 per cent. It would be of interest to know the diet employed in the series of cases treated with emetin and in those not so treated. High caloric diets have been of value in shortening the convalescence and reducing the mortality. It is important to know whether the patients not treated by emetin were under the personal observation of the authors and whether all other factors such as diet, hydrotherapy, and other therapeutic measures were the same in the two series. I should like to inquire as to the method of administration, dosage of the emetin, and the nature of any toxic symptoms noted. It is of interest that this series of patients showed no intestinal protozoa. I do not know of any previous studies where the stools were carefully examined with this in mind. The hemoclastic test of Widal has not met with satisfactory results in my hands. The variations in the leucocyte counts are so slight, and there are so many conditions of technique to be met, that I have not placed much reliance on them. The results of this series, however, are so uniform that we should perhaps consider the test of more value here than in other conditions. In closing I should like to commend the authors on their interesting report. We need more studies of this sort in the field of applied therapeutics.

Dr. Barrow (Closing)—A final report of this work will be made in a few months. The cases reported are endemic and not from any epidemic. The diet, hydrotherapy, and general care are alike in both groups of cases studied. Emetin hydrochloride is given intravenously in one-third grain doses twice daily for six or eight days. The dosage is then reduced to one injection daily until convalescence is established. By this method no toxic symptoms have appeared in our cases.